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RESEARCH ARTICLE

PREVALENCE OF HEPATITIS C VIRUS IN HAEMODIALYSIS PATIENTS, IN SUDAN

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ABSTRACT

Hepatitis C virus (HCV) is a major public health problem, with an estimated global prevalence of 3% occurring in about 170 million infected persons worldwide. An estimated prevalence of 5-20% of HCV infected patients have or will develop cirrhosis, 1-4% of whom will annually develop hepatocellular carcinoma (HCC). In Sudan, the incidence for HCC is high and increasing. In one study conducting among 150 HCC patients indicating that both Hepatitis B and C viruses were important risk factors of HCC in Sudan. The aim of this study was to determine the seroprevalence, and possible risk factors associated with hepatitis C virus (HCV) infection among hemodialysis patients in Khartoum State. Three hundred and night (n=308) subjects were enrolled in a cross-sectional study and investigated during the period from January to April 2010.

Results: The majority of the subjects examined were male (65.3%). Most of the patients tested were within age group 50-59 years. The specific anti-HCV antibodies were detected among 14.3% using the fourth generation enzyme linked immunosorbant assay (ELISA). Duration of dialysis and previous jaundice were significantly associated with HCV seropositivity ($p<0.05$). Patients who had a longer duration (5 years or more) were at higher risk to get infection with HCV than those who had shorter duration. Patients who had previous jaundice were suspected to get infection with HCV infection than those who had no previous jaundice. There was no significant difference ($P>0.05$) between the prevalence of HCV among married hemodialysis patients compared to single one. In conclusion, this fairly high prevalence of HCV among hemodialysis patients (14.3 %) should draw the attention of healthcare authorities to implementation new methodologies and improve the infrastructure of the dialysis centers, which could help improve quality of live of dialysis patients in Sudan.

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INTRODUCTION

Hepatitis C virus (HCV) is a major public health problem, with an estimated global prevalence of 3% occurring in about 170 million infected persons worldwide. An estimated prevalence of 5-20% of HCV infected patients have or will develop cirrhosis, 1-4% of whom will annually develop hepatocellular carcinoma (HCC) (Ray and Das, 2004). In Sudan, the incidence for HCC is high and increasing. In one study conducting among 150 HCC patients indicating that both Hepatitis B and C viruses were important risk factors of HCC in Sudan (Omer *et al*., 2001). The main transmission route of HCV is parenteral. However, approximately 10% were sporadic, without well defined transmission routes. Risk factors of HCV transmission include injection, drug use, blood product transfusion, organ transplantation (Yen *et al*., 2003), occupational exposure among health workers, unprotected sexual contact, and vertical transmission (Yen *et al*., 2003). Patients undergoing chronic hemodialysis potentially have increased risk of exposure to viral infections like hepatitis B(HBV) and Hepatitis C viruses (HCV). After cardiovascular disease and bacterial infections, viral hepatitis is the most frequent disease as complication of hemodialysis treatment. The prevalence of parenterally transmitted viral hepatitis in population of hemodialyzed patients is by far higher than the prevalence in the general population. There are several reasons for this condition.

In addition to character of this treatment, there is also the fact that for reasons of immunodeficiency, the proper course of infectious hepatitis in hemodialyzed patients is markedly more often terminated by development of the chronic state of disease with permanent viremia (De, Lamballerie, 1996). The reported prevalence among patients has varied greatly from 1.9% to 8.4 % in different countries in recent years (Mohamed and Khalil, 2008).

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MATERIALS AND METHODS

This is across sectional hospital based study that had been conducted in Khartoum Teaching hospital and Ibn Sina Specialized Hospital, renal dialysis unites. This study was carried out on Sudanese patients on regular hemodialysis in the above mentioned hospitals. During the period January to April 2010. All patients attending the above mentioned Hospital to hemodialysis, during study period were included. Approval was obtained from the college of graduate studies Sudan University of science and Technology. Permission was obtained from dialysis center administration in each of the 2 centers that were included in this study.

Sample collection

Under strict sterile conditions, 5ml of whole venous blood were obtained from the patients on regular hemodialysis. The specimens were collected in sterile plain containers. Serum was separated by centrifugation at 2000 rpm for 5 minutes and then stored at-4ºC until tested.

Laboratory test

Fourth generation ELISA was used to detect HCV antibodies according to the manufacture's guidelines.

Procedure

The following techniques were used according to the instruction of the manufacture. The rest reagents were brought to room temperature before being tested. The micro well-holder was taken with the required number of micro wells and the first well was let for the operation blanking.200µl of negative control was dispensed in 3 wells, and 200µl of positive control was dispensed in 2 wells. Aliquot of 200µl of sample diluents (DILSPE) was added to all the samples wells, and then 10µl of sample was added in each well. Aliquot of 50µl of assay diluents (DILAS) was dispensed into all the control and sample wells. The color changed from green to dark blue. The wells were sealed with adhesive sealing foil, and incubated at 37º C for 45 minutes. The wells were then washed 5 times then 100µl of enzyme conjugate was added into each well, except the blanking well. All the wells were covered with the sealer, and incubated at 37 ºC for 45 minutes. The wells were washed 5 times, 100 µl of chromogen substrate mixture was added into each well, then incubated at room temperature (18-24ºC) for 15 minutes. Aliquot of 100µl of sulfuric acid stopped solution was added in to all wells turned the positive control and positive samples into yellow color. Finally, the optical density (OD) of color (intensity of color) was measured at 450 nm with microplate reader.

Interpretation of results

The testes results were calculated by means of cut-off value determined with the following formula:

Cut-off OD mean's of negative controls+ 0.350.
Cut off= (0.045+0.090+0.065)/ 3+0.35= 0.416.

Test results are interpreted as ratio of the sample's OD and the cut-off value as the following:

< 0.0416 sample in non-reactive (negative).
>0.416 sample is reactive (positive).

Data analysis and presentation

The data was analyzed using statistical package for social sciences (SPSS) software program. Significance of the testing of difference between proportions were conducted using the Chi-square test, adjusted by person's or Fishers exact test, depending on the number of observations, with a value corresponding to $p<0.05$ for significance unless otherwise stated.

RESULTS

In the present study, most of the hemodialysis patients tested, were within the age group 50-59 years (21.8%), followed by 30-39 years (21.4 %), 40-49 years (19.2 %), 70 years (13 %), and <30 years (10.4%) (Table 1). The results of age in group was presented in Table (2). The analyzed data of positivity of HCV of hemodialysis patients was displayed in Table (3). In this study 75% of single patients were positive to HCV Table (4). The duration of hemodialysis was displayed in Table (5). The results of gender, marital status and center of hemodialysis and HCV positivity were displayed in Figure (1, 2, 3, and 4).

Table 1. Shows, distribution of hemodialysis patients according to age

Age groups(Years)	Frequency	Percentage
< 30 years	32	10.4
30-39 years	66	21.4
40-49 years	59	19.2
50-59 years	67	21.8
60-69years	44	14.3
70 years or more	40	13
Total	308	100

Table 2. Shows age in group of hemodialysis patients and HCV

Age group	HCV Positive	
	Frequency	%
< 30 years	5	11.4%
30-39 years	6	13.6%
40-49 years	11	25%
50-59 years	10	23%
60-69 years	8	18. %
70 years or more	4	9%
Total	44	100%

Table 3. Shows positivity of HCV among males and females

	HCV Positive	
Sex	Frequency	%
Males	33	75
Females	11	25
Total	44	100

Table 4. Shows the effect of marital status of hemodialysis on infection with HCV

		HCV Positive
Marital status	Frequency	%
Single	33	75%
Married	11	25%
Total	44	100%

Table 5. Shows the duration of hemodialysis and HCV

	HCV Positive	
Duration of hemodialysis	Frequency	%
< 5 years	23	52.2
5 years or more	21	47.8
Total	44	100

This study determined the seroprevalence of HCV among hemodialysis patients, and assessed the possible risk factors associated with HCV infection among them. In this study the prevalence of HCV among hemodialysis patients was 14.3%; which was less than finding previously reported in Sudan in 1994 by Suliman *et al*. (1995) 34.9 %, and in 2007 by EL-Amin *et al*. (2007) 23.7 %.

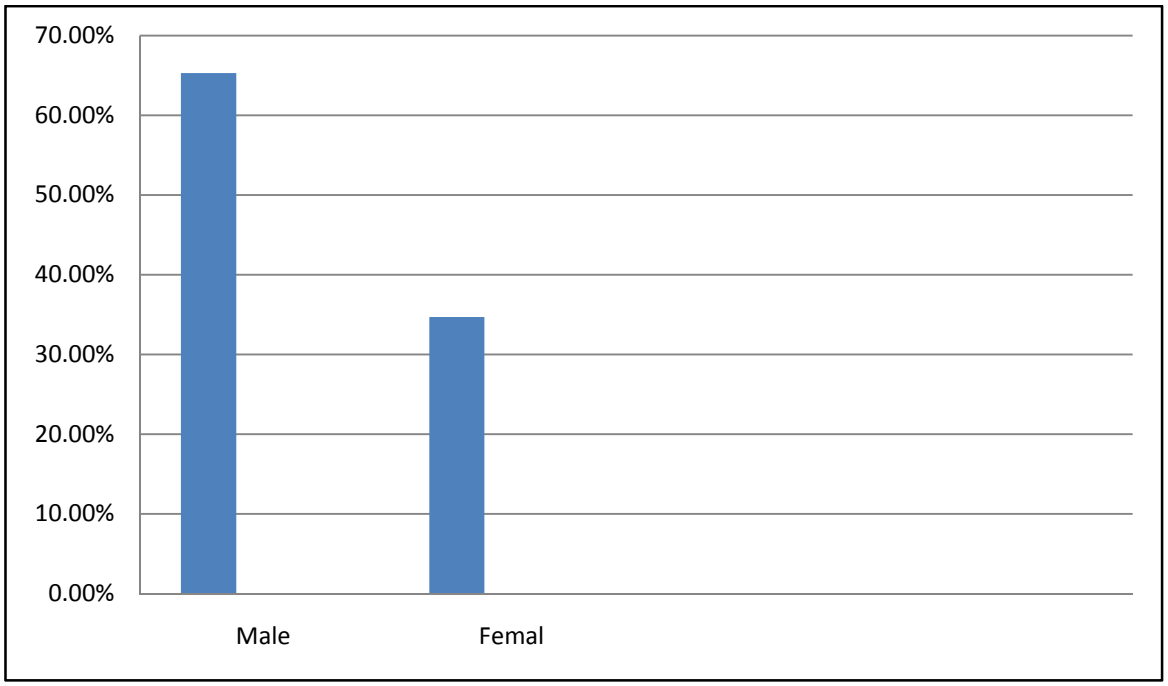

Figure 1. The majority of hemodialysis patients were males (65.3 %), and females were (34.7%)

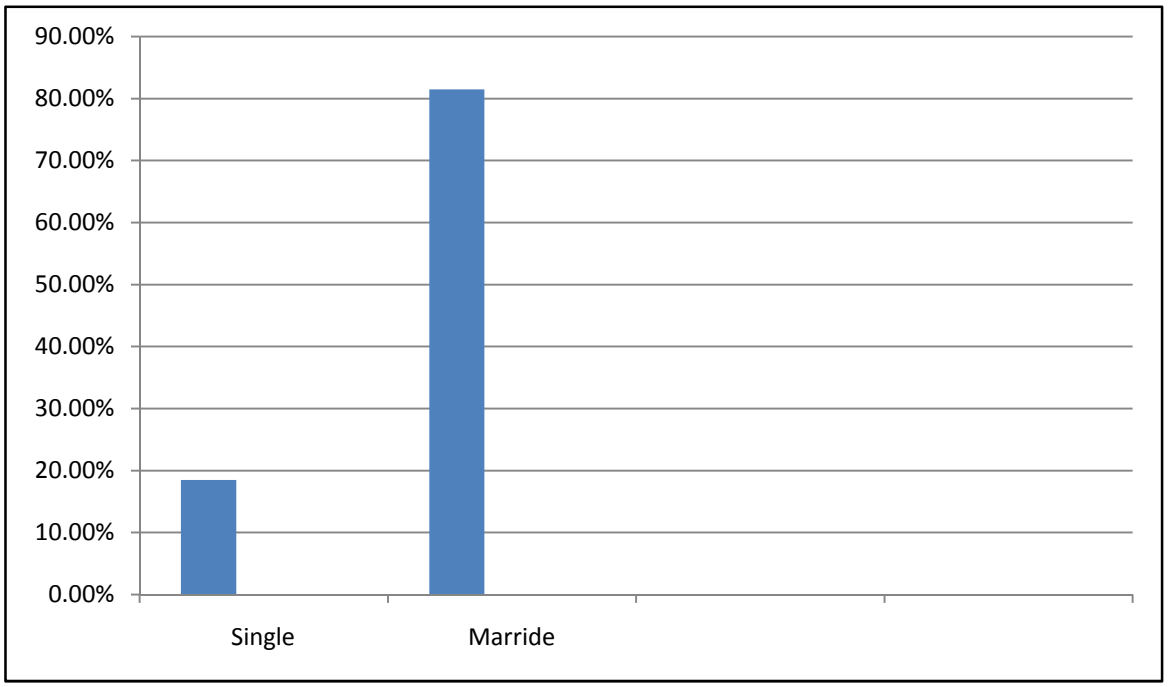

Figure 2. Demonstrates that the married hemodialysis patients comprised 81.5 %, and the single ones were 18.5%

DISCUSSION

Hemodialysis in end-stage renal failure patients is a life-saving procedure. However, patients undergoing chronic hemodialysis potentially have increased risk of exposure to HCV infection. It was also less than those reported by Daw *et al*. (2002) in Libya 20.5 %. Diouf *et al.* (2000) in Senegal. Also this finding was low compared to those obtained by Masconi *et al.* (1992) in Spain. However, HCV prevalence obtained in this study was similar to that reported by Huraib *et al*. (1995) in Suadi

Arabia. The reasons for these considerable differences in HCV seroprevalence are poorly understood. Disparities in ethnic background, gender, prevalence of HCV-sub types, hemodialysis duration, difference in magnitude of prevention measures applied, extent of immunological derangement in population, and difference in sample size and techniques used in each separate study, are all possible factors.

However, Al-Shohaib *et al*. (2003) in Saudi Arabia reported male sex to be associated with HCV seropositivity. Concerning the marital status of the patients, the analyzed data exhibited that there was no significant relationship between HCV and marital status. Somi, Etemadi (2002) in Iran found significant association between HCV seropositivity and marital status of hemodialysis patients.

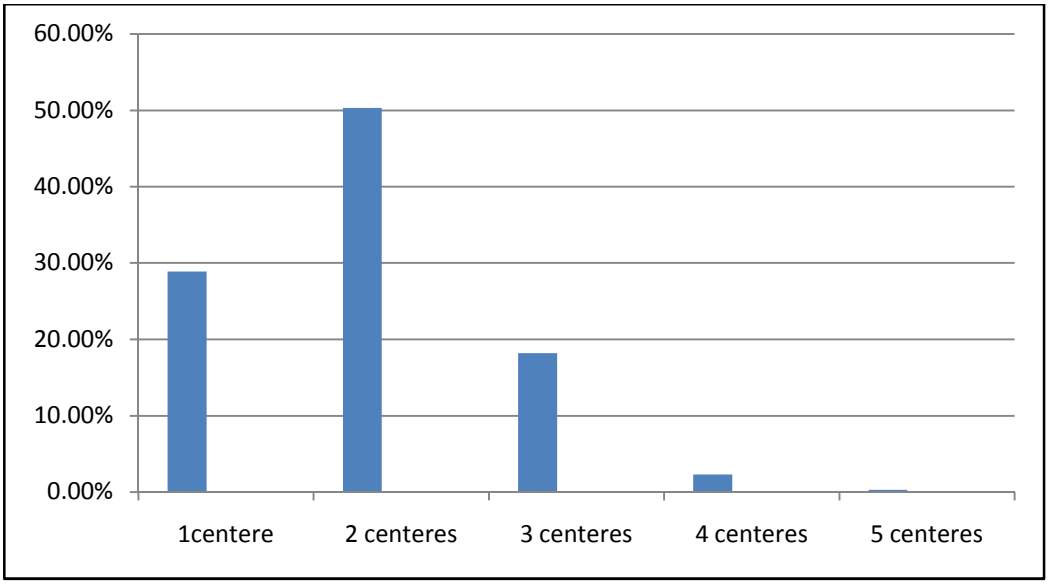

Figure 3. Shows patients and hemodialysis centers

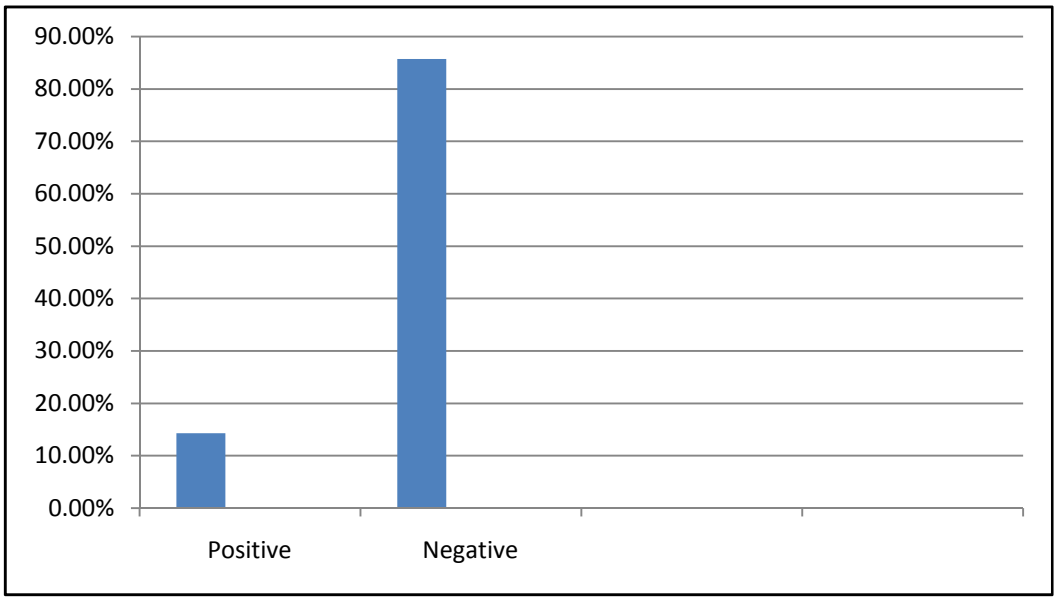

Figure 4. Shows detection of Anti-HCV antibodies among hemodialysis patients

With regard to the effect of age on infection with HCV, EL-Amin *et al*. (2007), and Saxena *et al*. (2004) reported that HCV older age assassinated with HCV seropositivity. In contrast, Kalantar *et al*. (2007) reported that HCV seropositivity among hemodialysis patients was associated with younger age. Surprisingly, this study did not observe significant relationship (P>0.05) between HCV seropositivity and patients ages. Gender of patients was not associated with HCV seropositivity among hemodialysis patients in this study. This was in agreement with Bdour *et al*. (2000) in Jourdan.

The finding of this study revealed that longer duration of dialysis (5 years or more) was a significant risk factor associated with HCV seropositivity (P=0.000). This finding was in conformance with that reported by Saad *et al*. (1995) in Saudi Arabia have reported in which they found strong association between duration of dialysis (more than 3 years) and HCV seropositivity. Similary, Hosseini *et al*. (2006) have reported a significant association between duration of dialysis and HCV infection. Mohammad *et al*. (2009) reported that patients undergoing hemodialysis more than 6 years had 11.03-

fold greater risk of HCV infection compared to patients with duration less than 3 years. Carneiro *et al*. (2001) in Brazaildemonstrated that patients on dialysis for more than 3 years had a 13.6-fold greater risk for HCV seropositivity in comparing to patients less than 1 year treatment. These finding superset strong nosocomial transmissions of HCV in dialysis unites, since some patients may be in an immunological window whilst sharing rooms and machines with other dialysis patients.

Blood transfusion is known to be a major risk factor for HCV transmission. The results of association between HCV seropositivity and history of blood transfusion in dialysis patients are conflicting. Whereas, some investigators reported positive correlation (Huraib, 2003), others did not (Hardy *et al*., 1992). Our results were in agreement with the later authors. In the past, blood transfusion was known to be essential risk factor to contract HCV infection, but introduction of new protocols for screening of blood donors has markedly reduced the risk of HCV transmission. Although El-Amin *et al.* (2007) reported significant association between HCV infection and previous surgery. This study observed that intravenous drug was not significantly associated (P>0.05) with HCV seropositivity which was in agreement with the result of Somi, Etemadi (2002), in Iran. This study found significant association (P<0.05) between HCV infection among dialysis patients and previous jaundice, which was in disagreement with the observations reported by El-amin *et al*. (2007). Some previous studies have shown that dialysis in multiple centers was a risk factors for HCV infection (El-Amin *et al*., 2007). In contrast this study demonstrated that dialysis in multiple centers was not significantly associated with HCV seropositivity (P>0.05).

Conclusion

Although HCV prevalence found in this study (14.3%) among hemodialysis patients was less than that reported previously, it is still frequent. In this study longer duration of dialysis (5 years or more) was shown to be a significant risk factor associated with HCV seropositivity. Patients who had previous jaundice were at higher risk to get HCV infection than those who had no previous jaundice. The finding of this study suggest that the environmental conditions of hemodialysis centers in Khartoum hospitals are potential source of infection with HCV among dialysis patients.

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